

(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 002 588 A1

(12)

## EUROPEAN PATENT APPLICATION

(43) Date of publication:  
24.05.2000 Bulletin 2000/21

(51) Int. Cl.<sup>7</sup>: B07B 1/46, B01D 33/03

(21) Application number: 00103595.5

(22) Date of filing: 12.02.1997

(84) Designated Contracting States:  
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC  
NL PT SE

(30) Priority: 12.02.1996 US 598566  
21.01.1997 US 786515

(62) Document number(s) of the earlier application(s) in  
accordance with Art. 76 EPC:  
97903439.4 / 0 880 411

(71) Applicant: Tuboscope I/P Inc.  
Houston, TX 77051 (US)

(72) Inventors:  
• Adams, Thomas Cole  
Hockley, Texas 77447 (US)  
• Schulte, David Lee Jr.  
Broussard, LA 70518 (US)  
• Grichar, Charles Newton  
Houston, Texas 77069 (US)

• Leone, Vincent Dominick Sr.  
Houston, Texas 77069 (US)  
• Walker, Jeffrey Earl  
Lafayette, LA 70501 (US)  
• Seyffert, Kenneth Wayne  
Houston, Texas 77009 (US)  
• McClung, Guy Lamont III  
Spring, Texas 77379-4578 (US)

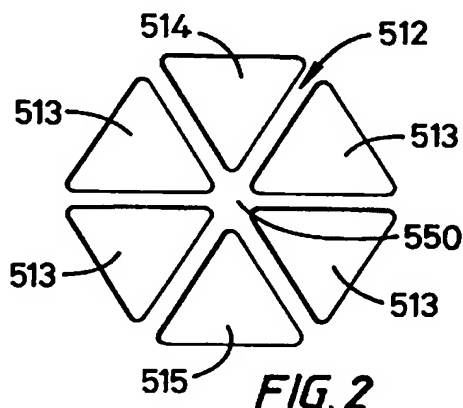
(74) Representative:  
Lucas, Brian Ronald  
Lucas & Co.  
135 Westhall Road  
Worlingham Surrey CR6 9HJ (GB)

Remarks:

This application was filed on 21 - 02 - 2000 as a  
divisional application to the application mentioned  
under INID code 62.

(54) Panel for a screen

(57) A panel for a screen, said panel comprising a plurality of groups of perforations, each group comprising six generally equal triangular apertures (513, 514, 515) arranged with their apices facing a central portion (550), wherein the apices of two (514, 515) opposing ones of said triangular apertures are spaced apart further than the apices of opposed ones of the remaining triangular apertures (513, 513; 513, 513).



## Description

[0001] This invention relates to a panel for a screen.

[0002] Vibrating screens have been employed for many years to separate particles in a wide array of industrial applications. One common application of vibrating screens is in drilling operations to separate particles suspended in drilling fluids. The screens are generally flat and are mounted generally horizontally on a vibrating mechanism or shaker that imparts either a rapidly reciprocating linear, elliptical or circular motion to the screen. Material from which particles are to be separated is poured onto a back end of the screen, usually from a pan mounted above the screen. The material generally flows toward the front end of the screen. Large particles unable to move through the screen remain on top of the screen and move toward the front of the screen where they are collected. The smaller particles and fluid flow through the screen and collect in a pan beneath the screen.

[0003] A vibrating screen may be formed from one or more layers of wire mesh. Wire mesh is generally described with reference to the diameter of the wires from which it is woven, the number wires per unit length (called mesh count), and the shape or size of the openings between wires. Wire mesh comes in various grades. "Market" grade mesh generally has wires of relatively large diameter. "Mill" grade has comparatively smaller diameter wires and "bolting cloth" has the smallest diameter wire. The type of mesh chosen depends on the application. Smaller diameter wires have less surface and thus less drag, resulting in greater flow rates. Smaller diameter wires also result, for a given opening size, in a larger percentage of open area over the total area of the screen, thus allowing greater flow rates and increased capacity. However, screens of bolting cloth tear more easily than market or mill grade screens, especially when used in harsh conditions such as drilling and mining operations. The smaller diameter wires tend to have less tensile strength and break more easily, and the finer mesh also tends not to retain its shape well.

[0004] It is known to support screening mesh with a sheet of perforate material. For example, WO-A-94/23849 discloses a flat screen for separating solids from drilling fluid comprising a sheet of perforate material which underlies and supports one or more layers of mesh. The sheet of perforate material comprises transverse ribs which define a series of triangular openings. It will be noted that the triangular openings are arranged in groups with the apices of the triangular openings in each group facing one another, each opposite pair of openings separated by the same distance as any other opposite pair.

[0005] One problem with such an arrangement is that a relatively large surface area is taken up by the support sheet, thereby reducing the throughput of the screen. Another problem is that the support sheet is

structurally weak at certain points which reduces the longevity of the screen.

[0006] The present invention aims to address one or more such problems.

[0007] According to the present invention there is provided a panel for a screen, said panel comprising a plurality of groups of perforations, each group comprising six generally equally triangular apertures arranged with their apices facing a central portion, wherein the apices of two opposing ones of said triangular apertures are spaced apart further than the apices of opposed ones of the remaining triangular apertures.

[0008] Further features are set out in Claims 2 to 4.

[0009] For a better understanding of the present invention reference will now be made, by way of example, to the accompanying drawings, in which:-

Fig. 1 is a plan view of part of a panel for a screen;  
Fig. 2 is a plan view of part of a panel for a screen in accordance with the present invention;  
Fig. 3 is a perspective view of a screen;  
Fig. 4 shows, to an enlarged scale, a detail of part of the screen shown in Figure 3; and  
Figs. 5 to 9 show end views of five different embodiments of corrugated panels mounted on supports.

[0010] Referring to Fig. 1 there is shown a pattern of triangular openings in a perforated panel 510 (made of metal or metal-like material). The openings 511 are positioned side-by-side in an array that extends across substantially all of a panel. The panel may be corrugated or flat or a combination thereof with alternating flat and corrugated portions.

[0011] Fig. 2 shows the pattern of the triangular openings for the perforated plate 512. It will be noted that the openings 514 and 515 are spaced apart from each other slightly more than the middle openings of the plate 510 producing, in certain embodiments, stronger central portions 550. The panel may be corrugated or flat or a combination thereof with alternating flat and corrugated portions.

[0012] In the pattern of openings in Fig. 2, the pattern is shifted slightly as compared to that of the panel 510 to optimize use of a screening surface. For example, a screen using the pattern of Fig. 1 and a web width (distance between two adjacent openings) of 3.17mm (0.125"), has a border on each edge. By shifting the triangular openings to that of Fig. 2, a web width of 3.17mm (0.125") may be maintained while decreasing the border. This allows more openings in the screen of Fig. 2 as compared to that of Fig. 1, thus increasing surface area and improving appearance.

[0013] In the pattern of Fig. 1, the openings are arranged in rows with bases and peaks alternating. The peak of one opening is level with the base of the next. In the pattern of Fig. 2 the openings 513 are moved closer together and the peaks of the openings 513 are not level with the base of the opening 514 or 515.

**[0014]** Figs. 3 and 4 show a screen 530 with a corrugated support panel 540 (preferably made of metal) having a plurality of triangular openings 538 (not shown in Fig. 3; see Fig. 4) thereacross the surface of and therethrough; optional upturned edges 534 and 537 for anchoring the screen 530 to a vibratory shaker; wire mesh or meshes 539 secured to the panel 540; and plugs 536 at both ends to plug ridge openings 532 at each end of the corrugations of the plate 540. The plate 540 rests on and is secured to a strip or strips 551 (alternatively a frame or multiple strips criss-crossing the plate 540 or a series all in the same direction, or a perforated plate may be used). In one aspect the strip(s) 551 are omitted. The strips 551 may be made of any suitable material, including, but not limited to, metal, plastic, fiberglass, rubber, or cermet.

**[0015]** A screen according to the present invention may be made without a plastic grid located between a lower panel and a screen(s) or mesh(es) above the plastic grid. When screening material is bonded to a corrugated perforated panel (e.g. as in Fig. 4), thermal expansion puts the screening material in tension. Such a result is not produced when a plastic grid process is used. A metal corrugated perforated panel withstands tension induced thereon by screening material applied and/or bonded thereto. In one aspect the panel is first covered with adhesive (e.g. powdered epoxy) then the mesh(es) and/or screen(s) are placed on the panel. Upon curing of the epoxy, adhesive 541 covers or envelops part of the mesh/screen at the solid areas of the panel.

**[0016]** Figs. 5-9 present a variety of configurations for corrugated perforated panels according to the present invention.

**[0017]** Fig. 5 shows a corrugated panel A on a support strip B having optional mounting hooks C.

**[0018]** Fig. 6 shows a corrugated panel D on a support strip E. Optionally, mounting hooks may be used with such an assembly.

**[0019]** Fig. 7 shows a support strip F. A corrugated perforated panel may have such a configuration and mounting hooks may be used with the strips or with the plate.

**[0020]** Fig. 8 shows a support strip G. A corrugated perforated panel may have such a configuration and mounting hooks may be used with the strips or with the plate.

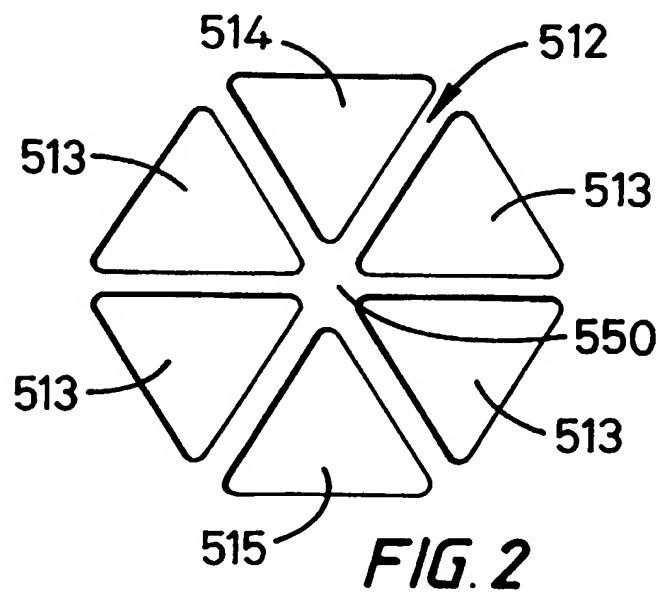
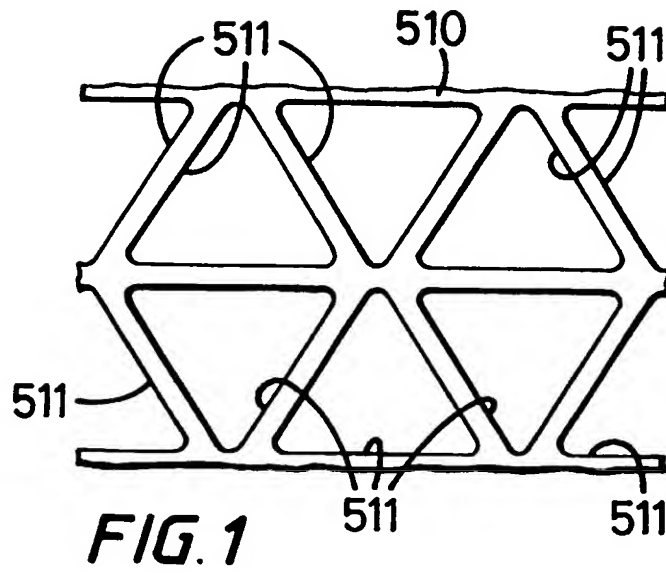
**[0021]** Fig. 9 shows a corrugated perforated panel H on a support strip I having optional mounting hooks J.

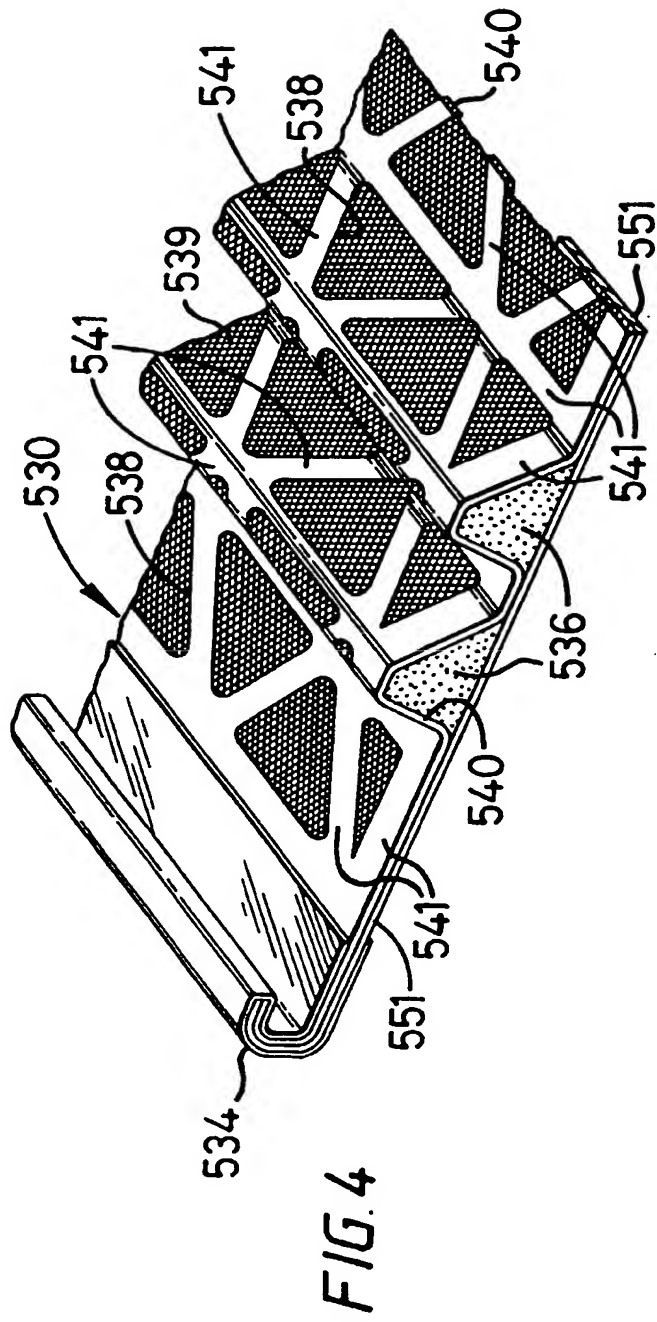
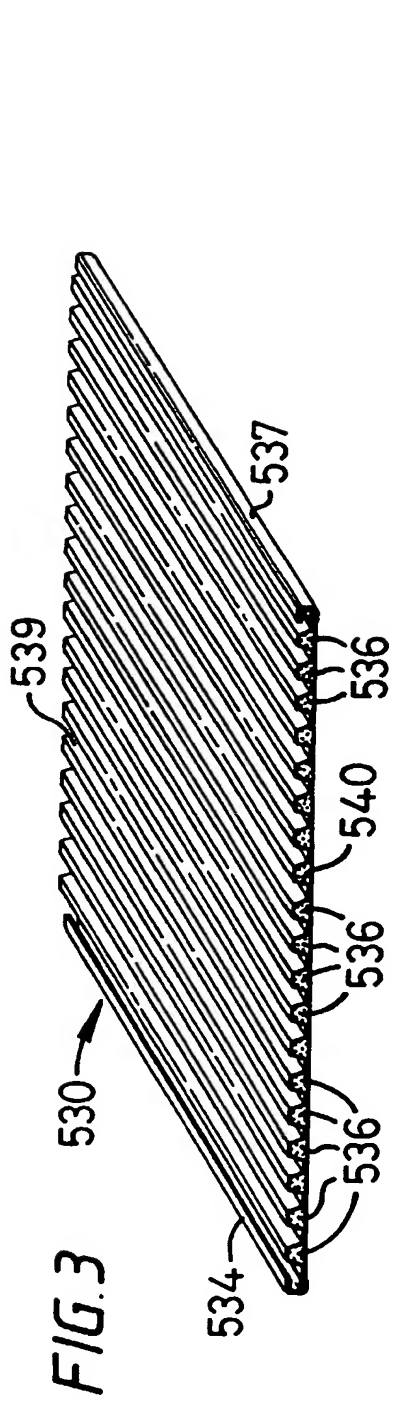
spaced apart further than the apices of opposed ones of the remaining triangular apertures (513, 513; 513, 513).

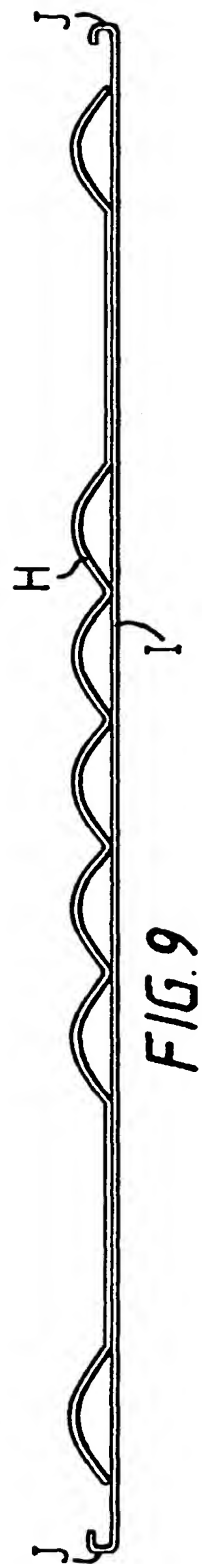
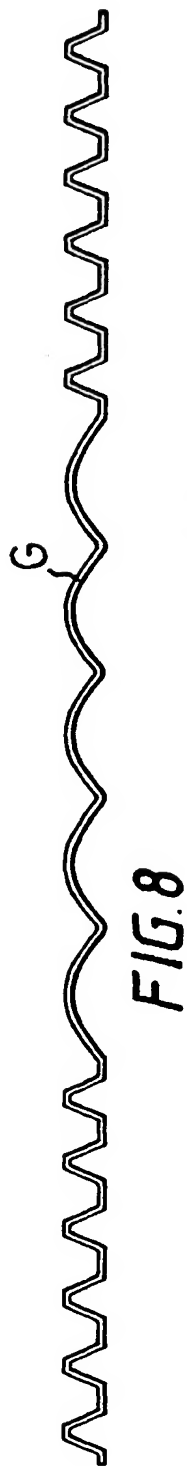
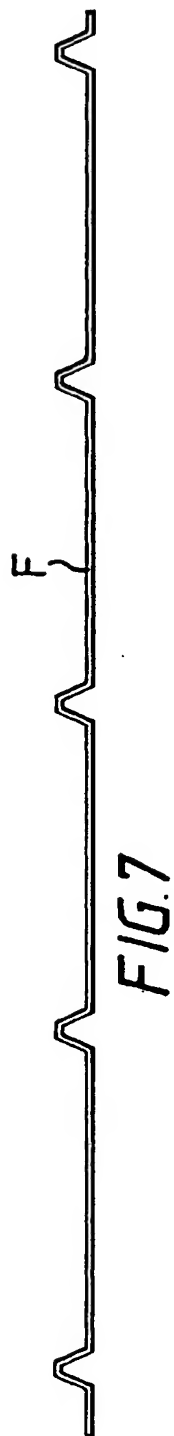
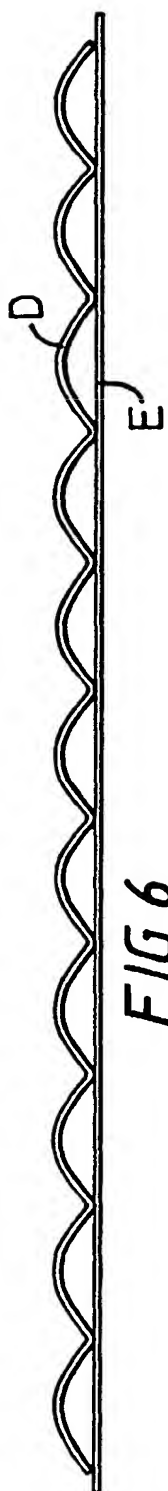
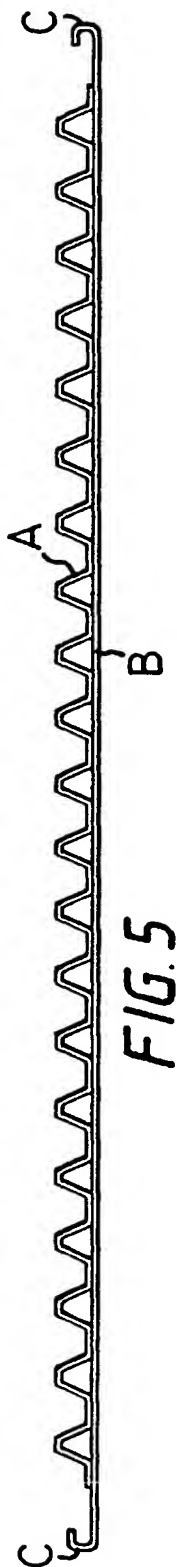
2. A panel as claimed in Claim 1, wherein the bases of said two (514, 515) opposing ones of said triangular apertures are parallel to the sides of said panel.
3. A panel as claimed in Claim 1 or 2, including an edge member for facilitating mounting said panel to a vibratory shaker.
4. A panel as claimed in Claim 1, 2 or 3, wherein said panel is provided with at least one layer of mesh which is secured thereto.

#### Claims

1. A panel for a screen, said panel comprising a plurality of groups of perforations, each group comprising six generally equal triangular apertures (513, 514, 515) arranged with their apices facing a central portion (550), wherein the apices of two (514, 515) opposing ones of said triangular apertures are









European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 00 10 3595

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A, D	WO 94 23849 A (ENVIRONMENTAL PROCEDURES) 27 October 1994 (1994-10-27) * page 6, line 21 - page 7, line 24 * * figures 3,4 *	1-4	B07B1/46 B01D33/03
A	WO 94 15724 A (DERRICK) 21 July 1994 (1994-07-21)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B07B B01D
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>22 March 2000</b>	Examiner <b>Laval, J</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 10 3595

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-03-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9423849 A	27-10-1994	US 5385669 A	31-01-1995
		AU 6677594 A	08-11-1994
		DE 69419908 D	09-09-1999
		DE 69419908 T	02-12-1999
		EP 0693004 A	24-01-1996
		NO 952867 A	19-07-1995
		US 5971159 A	26-10-1999
WO 9415724 A	21-07-1994	US 5417858 A	23-05-1995
		AU 693086 B	25-06-1998
		AU 6023194 A	15-08-1994
		AU 690096 B	23-04-1998
		AU 6084494 A	15-08-1994
		AU 714591 B	06-01-2000
		AU 6593998 A	09-07-1998
		CA <sup>A</sup> 2152602 A	21-07-1994
		CA 2152610 A	21-07-1994
		DE 69420701 D	21-10-1999
		DE 69420701 T	02-03-2000
		DE 69421381 D	02-12-1999
		EP 0680386 A	08-11-1995
		EP 0680385 A	08-11-1995
		US 6000556 A	14-12-1995
		WO 9415723 A	21-07-1994
		US 5417859 A	23-05-1995
		US 5417793 A	23-05-1995
		US 5783077 A	21-07-1998
		US 5720881 A	24-02-1998
		US 5868929 A	09-02-1999
		US 5876552 A	02-03-1999
		US 5958236 A	28-09-1999
		US 5944993 A	31-08-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82